

**FORSPAN ASSESSMENT MODEL FOR CONTINUOUS
ACCUMULATIONS--BASIC INPUT DATA FORM (NOGA, Version 9, 2-10-03)**

IDENTIFICATION INFORMATION

Assessment Geologist:	D.K. Higley-Feldman	Date:	27-Oct-10
Region:	North America	Number:	5
Province:	Anadarko Basin	Number:	5058
Total Petroleum System:	Pennsylvanian Composite	Number:	505802
Assessment Unit:	Thirteen Finger Limestone-Atoka Shale Gas	Number:	50580261
Based on Data as of:			
Notes from Assessor:	Woodford Shale Gas, Assessment Unit 50620261 as analog		

CHARACTERISTICS OF ASSESSMENT UNIT

Assessment-unit type: Oil (<20,000 cfg/bo) or Gas (≥20,000 cfg/bo), incl. disc. & pot. additions Gas

What is the minimum total recovery per cell? 0.02 (mmbo for oil A.U.; bcfg for gas A.U.)

Number of tested cells: 0

Number of tested cells with total recovery per cell ≥ minimum: 0

Established (discovered cells): Hypothetical (no cells): X

Median total recovery per cell (for cells ≥ min.): (mmbo for oil A.U.; bcfg for gas A.U.)

1st 3rd discovered 2nd 3rd 3rd 3rd

Assessment-Unit Probabilities:

<u>Attribute</u>	<u>Probability of occurrence (0-1.0)</u>
1. CHARGE: Adequate petroleum charge for an untested cell with total recovery ≥ minimum.	<u>1.0</u>
2. ROCKS: Adequate reservoirs, traps, seals for an untested cell with total recovery ≥ minimum.	<u>1.0</u>
3. TIMING: Favorable geologic timing for an untested cell with total recovery ≥ minimum.	<u>1.0</u>
Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):	<u>1.0</u>

NO. OF UNTESTED CELLS WITH POTENTIAL FOR ADDITIONS TO RESERVES

1. Total assessment-unit area (acres): (uncertainty of a fixed value)

calculated mean 5,389,000 minimum 4,850,000 mode 5,389,000 maximum 5,928,000

2. Area per cell of untested cells having potential for additions to reserves (acres): (values are inherently variable)

calculated mean 167 minimum 60 mode 120 maximum 320

uncertainty of mean: minimum 120 maximum 200

3. Percentage of total assessment-unit area that is untested (%): (uncertainty of a fixed value)

calculated mean 100 minimum 100 mode 100 maximum 100

NO. OF UNTESTED CELLS WITH POTENTIAL FOR ADDITIONS TO RESERVES
(Continued)

4. Percentage of untested assessment-unit area that has potential for additions to reserves (%):
(a necessary criterion is that total recovery per cell \geq minimum; uncertainty of a fixed value)

calculated mean 27 minimum 1 mode 20 maximum 60

Geologic evidence for estimates:

Extensive conventional production from Morrowan-Atokan reservoirs. This may include some Thirteen Finger and Atoka Shale production, but this cannot be verified because of poor documentation regarding producing horizons. The Morrowan-Atokan in the deep basin is mostly overpressured, so Thirteen Finger-Atokan oil and gas would be detectable. Oil would be normally pressured to underpressured in Colorado and Kansas. Texas is heavily drilled and produced from conventional Morrow-Atoka.

TOTAL RECOVERY PER CELL

Total recovery per cell for untested cells having potential for additions to reserves:
(values are inherently variable; mmbo for oil A.U.; bcfg for gas A.U.)

calculated mean 0.78 minimum 0.02 median 0.5 maximum 10

AVERAGE COPRODUCT RATIOS FOR UNTESTED CELLS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

<u>Oil assessment unit:</u>	minimum	mode	maximum
Gas/oil ratio (cfg/bo)	<u> </u>	<u> </u>	<u> </u>
NGL/gas ratio (bngl/mmcf)	<u> </u>	<u> </u>	<u> </u>
<u>Gas assessment unit:</u>			
Liquids/gas ratio (bliq/mmcf)	<u>6</u>	<u>12</u>	<u>18</u>

Assessment Unit (name, no.)
Thirteen Finger Limestone-Atoka Shale Gas, 50580261

SELECTED ANCILLARY DATA FOR UNTESTED CELLS

(values are inherently variable)

Oil assessment unit:

	minimum	mode	maximum
API gravity of oil (degrees)	<u> </u>	<u> </u>	<u> </u>
Sulfur content of oil (%)	<u> </u>	<u> </u>	<u> </u>
Depth (m) of water (if applicable)	<u> </u>	<u> </u>	<u> </u>

Drilling depth (m)

minimum	F75	mode	F25	maximum
<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>

Gas assessment unit:

	minimum	mode	maximum
Inert-gas content (%)	<u>0.00</u>	<u>1.00</u>	<u>70.00</u>
CO ₂ content (%)	<u>0.00</u>	<u>0.60</u>	<u>6.00</u>
Hydrogen sulfide content (%)	<u>0.00</u>	<u>0.20</u>	<u>1.50</u>
Heating value (BTU)	<u>315</u>	<u>1150</u>	<u>1509</u>
Depth (m) of water (if applicable)	<u> </u>	<u> </u>	<u> </u>

Drilling depth (m)

minimum	F75	mode	F25	maximum
<u>2800</u>	<u> </u>	<u>4500</u>	<u> </u>	<u>5800</u>

Success ratios:

calculated mean

	calculated mean	minimum	mode	maximum
Future success ratio (%)	<u>73</u>	<u>50</u>	<u>80</u>	<u>90</u>

Historic success ratio, tested cells (%)

Completion practices:

1. Typical well-completion practices (conventional, open hole, open cavity, other)	<u>open-hole</u>
2. Fraction of wells drilled that are typically stimulated	<u>100</u>
3. Predominant type of stimulation (none, frac, acid, other)	<u>frac</u>
4. Fraction of wells drilled that are horizontal	<u>80</u>

Assessment Unit (name, no.)
Thirteen Finger Limestone-Atoka Shale Gas, 50580261

ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO STATES

Surface Allocations (uncertainty of a fixed value)

1.	<u>Oklahoma</u>	represents	<u>87.48</u>	area % of the AU
	<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
	Volume % in entity	<u> </u>	<u> </u>	<u> </u>
	<u>Gas in gas assessment unit:</u>			
	Volume % in entity	<u> </u>	<u>90.00</u>	<u> </u>
2.	<u>Texas</u>	represents	<u>12.52</u>	area % of the AU
	<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
	Volume % in entity	<u> </u>	<u> </u>	<u> </u>
	<u>Gas in gas assessment unit:</u>			
	Volume % in entity	<u> </u>	<u>10.00</u>	<u> </u>
3.	<u> </u>	represents	<u> </u>	area % of the AU
	<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
	Volume % in entity	<u> </u>	<u> </u>	<u> </u>
	<u>Gas in gas assessment unit:</u>			
	Volume % in entity	<u> </u>	<u> </u>	<u> </u>
4.	<u> </u>	represents	<u> </u>	area % of the AU
	<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
	Volume % in entity	<u> </u>	<u> </u>	<u> </u>
	<u>Gas in gas assessment unit:</u>			
	Volume % in entity	<u> </u>	<u> </u>	<u> </u>
5.	<u> </u>	represents	<u> </u>	area % of the AU
	<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
	Volume % in entity	<u> </u>	<u> </u>	<u> </u>
	<u>Gas in gas assessment unit:</u>			
	Volume % in entity	<u> </u>	<u> </u>	<u> </u>
6.	<u> </u>	represents	<u> </u>	area % of the AU
	<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
	Volume % in entity	<u> </u>	<u> </u>	<u> </u>
	<u>Gas in gas assessment unit:</u>			
	Volume % in entity	<u> </u>	<u> </u>	<u> </u>

Assessment Unit (name, no.)
Thirteen Finger Limestone-Atoka Shale Gas, 50580261

7.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
8.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
9.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
10.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
11.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
12.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____

ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO GENERAL LAND OWNERSHIPS

Surface Allocations (uncertainty of a fixed value)

1. <u>Federal Lands</u>	represents	<u>1.04</u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u>1.00</u>	<u> </u>
2. <u>Private Lands</u>	represents	<u>97.51</u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u>98.00</u>	<u> </u>
3. <u>Tribal Lands</u>	represents	<u>0.05</u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u>0.00</u>	<u> </u>
4. <u>Other Lands</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
5. <u>OK State Lands</u>	represents	<u>1.30</u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u>1.00</u>	<u> </u>
6. <u>TX State Lands</u>	represents	<u>0.10</u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u>0.00</u>	<u> </u>

Assessment Unit (name, no.)
Thirteen Finger Limestone-Atoka Shale Gas, 50580261

7.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
8.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
9.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
10.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
11.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
12.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____

ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO FEDERAL LAND SUBDIVISIONS

Surface Allocations (uncertainty of a fixed value)

1. <u>Bureau of Land Management (BLM)</u>	represents		area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity			
<u>Gas in gas assessment unit:</u>			
Volume % in entity			
2. <u>BLM Wilderness Areas (BLMW)</u>	represents		area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity			
<u>Gas in gas assessment unit:</u>			
Volume % in entity			
3. <u>BLM Roadless Areas (BLMR)</u>	represents		area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity			
<u>Gas in gas assessment unit:</u>			
Volume % in entity			
4. <u>National Park Service (NPS)</u>	represents		area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity			
<u>Gas in gas assessment unit:</u>			
Volume % in entity			
5. <u>NPS Wilderness Areas (NPSW)</u>	represents		area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity			
<u>Gas in gas assessment unit:</u>			
Volume % in entity			
6. <u>NPS Protected Withdrawals (NPSP)</u>	represents		area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity			
<u>Gas in gas assessment unit:</u>			
Volume % in entity			

Assessment Unit (name, no.)
 Thirteen Finger Limestone-Atoka Shale Gas, 50580261

7. <u>US Forest Service (FS)</u>	represents	<u>0.57</u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u>0.60</u>	<u> </u>
8. <u>USFS Wilderness Areas (FSW)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
9. <u>USFS Roadless Areas (FSR)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
10. <u>USFS Protected Withdrawals (FSP)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
11. <u>US Fish and Wildlife Service (FWS)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
12. <u>USFWS Wilderness Areas (FWSW)</u>	represents	<u> </u>	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>
<u>Gas in gas assessment unit:</u>			
Volume % in entity	<u> </u>	<u> </u>	<u> </u>

Assessment Unit (name, no.)
 Thirteen Finger Limestone-Atoka Shale Gas, 50580261

13. <u>USFWS Protected Withdrawals (FWSP)</u>	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____
<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	_____	_____
14. <u>Wilderness Study Areas (WS)</u>	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____
<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	_____	_____
15. <u>Department of Energy (DOE)</u>	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____
<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	_____	_____
16. <u>Department of Defense (DOD)</u>	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____
<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	_____	_____
17. <u>Bureau of Reclamation (BOR)</u>	represents	0.45	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____
<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	0.40	_____
18. <u>Tennessee Valley Authority (TVA)</u>	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____
<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	_____	_____

Thirteen Finger Limestone-Atoka Shale Gas, 50580261

19. Other Federal represents 0.02 area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	<u> </u>	<u> </u>	<u> </u>

<u>Gas in gas assessment unit:</u>			
Volume % in entity	_____	0.00	_____

20. _____ represents _____ area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity	_____	_____	_____

Gas in gas assessment unit:

Volume % in entity _____

ALLOCATIONS OF POTENTIAL ADDITIONS TO RESERVES TO ECOSYSTEMS

Surface Allocations (uncertainty of a fixed value)

1. Redbed Plains (RBPL) represents 72.76 area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity			

<u>Gas in gas assessment unit:</u>	
Volume % in entity	75.00

2. South-Central Great Plains (SCGP) represents 0.28 area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity			

<u>Gas in gas assessment unit:</u>	
Volume % in entity	0.00

3. Southern High Plains (SHPL) represents 3.51 area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity			

<u>Gas in gas assessment unit:</u>	
Volume % in entity	2.00

4. Texas High Plains (TXHP) represents 23.46 area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity			

<u>Gas in gas assessment unit:</u>	
Volume % in entity	23.00

5. _____ represents _____ area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity			

Gas in gas assessment unit:
Volume % in entity

6. _____ represents _____ area % of the AU

<u>Oil in oil assessment unit:</u>	minimum	mode	maximum
Volume % in entity			

Gas in gas assessment unit:
Volume % in entity

Assessment Unit (name, no.)
Thirteen Finger Limestone-Atoka Shale Gas, 50580261

7.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
8.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
9.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
10.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
11.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
12.	_____	represents	_____	area % of the AU
<u>Oil in oil assessment unit:</u>	minimum		mode	maximum
Volume % in entity	_____		_____	_____
<u>Gas in gas assessment unit:</u>				
Volume % in entity	_____		_____	_____
